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vations in monthly sequence, accompanied by observations on the pulse, respiration and atmospheric temperature.

The following are the principal conclusions which seem to be warranted by the results :—

1. That the temperature of man within the tropics, on an average, is nearly  $1^{\circ}$  higher than in a temperate climate, such as that of England.

2. That it is constantly fluctuating, in health, within a range of from  $1^{\circ}$  to  $2^{\circ}$  in the twenty-four hours.

3. That the order of its fluctuation is not the same as in England, being lowest in the early morning, after the night's rest, and not as in England, at night, before going to rest.

4. That all exertion, whether of body or mind, except it be very gentle, varies the temperature; that gentle exercise, as carriage exercise or slow walking, has a depressing influence.

5. That between the temperature of the surface of the body and that of the deep-seated parts, there is little difference, not exceeding on the average  $2^{\circ}$  or  $3^{\circ}$ , and often less; with which there appears to be connected increased activity of the function of the skin and a diminished action of the kidneys.

6. That in a healthy state of the system, increase of temperature from exercise or any other exciting cause, is of short duration, rapidly subsiding on rest, and commonly followed by some depression, *i. e.* below its average degree.

7. That in sea-sickness, except when severe, the tendency is to equalization of temperature; but when severe, to increase of temperature, the marked effect of deranged health, with few if any exceptions.

8. That a sea voyage without sea-sickness, has also an equalizing influence on the temperature, not preventing however its increase with increase of atmospheric temperature, and its lowering with diminution of atmospheric temperature.

The author expresses belief that the results obtained admit of practical application in relation to health and disease: on this part of the subject, however, as unsuitable to the occasion, he does not dwell, reverting only to the circumstance pointed out in his former paper and now confirmed, that variation, not equability of the temperature of man within certain limits, however produced, is conducive to health, presenting therein an instance of happy adaptation as regards his mode of life and sphere of action.

The Society then adjourned to the 16th of May.

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May 16, 1850.

The EARL OF ROSSE, President, in the Chair.

The following papers were read :—

1. "On the Geographical Distribution of the *Bulimi*, a group of terrestrial *Mollusca*; and on the modification of their calcifying functions according to the local physical conditions in which the

species occur." By Lovell Reeve, Esq., F.L.S. Communicated by Gideon Algernon Mantell, Esq., LL.D., F.R.S.

The preparation of a monograph of the terrestrial genus *Bulimus* having enabled the author to collect good authentic data concerning the localities and circumstances of their habitation, this memoir embodies his observations on their general distribution under types and provinces of types, and on the relation between the substance and colouring of the shell, and the differences of vegetation, temperature, and other physical conditions under which it is formed.

*Bulimi* being of less fugitive habits than most tribes of animals, are distributed over the equatorial, tropical, and warm temperate regions of the earth in assemblages of species limited in their range, and, so far as regards the shell, of very distinct typical character. The soft parts are much less variable, and being naturally sluggish, with few means of transport, little migration occurs even where there are no such natural boundaries as seas, deserts, or mountain chains. Owing to their arboreal habits the author considers the *Bulimi* fitter subjects for investigating the laws of geographical distribution than the *Helices* which live more in the earth, and are less influenced by the conditions with which they are surrounded. The few *Bulimi* of ground habits differ typically but little in countries very remote from each other. The localities of about five hundred species are known, and the majority are registered with their circumstances of habitation. Their area of geographical distribution lies between 40° south and 35° north in the New World, and between 42° south and 60° north in the Old World; that is, between the southern extremity of Chili and Texas in the former, and between Van Diemen's Land and Sweden in the latter; and there is no country within this area of which the *Bulimi* do not form part of the zoology. Regarding the shell with reference to its distinctions of form, composition, and system of colours, for the little variation in the living animal seems inadequate to the purpose, the *Bulimi* are distributed over this area in seven provinces of about forty typical assemblages of species, of which three-fifths inhabit the western hemisphere, and the remaining two-fifths, with a wider range and greater local variety of character in conformity with the more varied arrangement of the land, inhabit the eastern.

The author distinguishes the typical provinces of distribution as Venezuelan, Brazilian, Chilian, Bolivian, Caucasian, Malayan and African, and passes through the consideration of each in detail. The conditions most favourable to the calcifying functions of the *Bulimi* are an abundance of decaying vegetable matter, with an equable temperature of from 80° to 85°, in dark, close, humid woods, among shady thickets or in ravines. Near the sea-level in thin calcareous soil, and in sandy plains, where the vegetation is scanty and parched, or in grassy savannahs, the shell is light and often vividly coloured. In species which burrow in the earth, the shell is mostly colourless, and often of glassy tenuity.

The highest condition of the genus is in intertropical America,

and its northern limit ranges in both hemispheres with the parallels of equal temperature laid down by Humboldt. The calcified condition of the genus corresponds also with the curves northward in the isothermal lines along the west coast of South America and those bending southward on the east side; the *Bulimi* having a colder aspect in Chili from the cold precipitated by the great Antarctic current of cold water which flows nearly to the Galapagos Islands, than those of the opposite Brazilian coast which are affected by the equatorial current. In Patagonia the genus is suddenly arrested in a tropical condition by the recent geological changes that have taken place in that now barren and riverless country. The memoir proceeds to show that in the distant islands of the Pacific the *Bulimi* are curiously represented by other genera of terrestrial mollusks; whilst the species of islands approximating to continents, such as Trinidad, partake of the character of those of the main land.

The European species belong to the Caucasian type, which has its centre in Asia Minor, where the shell is mostly colourless, owing to the dry, juiceless, thorny character of the vegetation which affords little nutriment, and the *Bulimi* live mostly under blocks of wood or stone. This type reaches nearly to the south-eastern corner of Asia, where it is suddenly met at Birmah and in the Malacca peninsula by the richly-coloured Malayan type, which is so abundantly and beautifully represented in the islands of the Eastern Archipelago. The distribution of the genus among these islands is remarkably local. The *Bulimi* of North Africa partake of the character of those of Europe, whilst those inhabiting south of the equator belong to a totally different type.

The precise localities and circumstances of habitation of the various genera of Mollusca have as yet been too imperfectly noted by travellers to aid much in determining the laws relating to geographical distribution. The present summary of collected facts may prove suggestive of more careful observation, and, in the hands of those who are acquainted with the geological and physical history of the earth's surface, lead to important and interesting results.

The paper is illustrated with a map constructed with tints of shade, colours, and isothermal lines.

2. "On the influence of Physical Agents on the development of the Tadpole of the Triton and the Frog." By John Higginbottom, Esq. Communicated by Thomas Bell, Esq., Sec. R.S.

Mr. Higginbottom's experiments were made in different positions and degrees of temperature, many of them in a rock cellar 30 feet deep, where no solar light ever entered, and where the temperature varied only in the course of the year from 48° to 55° Fahr.

The results of numerous experiments showed that the development of the tadpole was principally hastened or retarded by temperature and the supply of food, and that, contrary to the opinion of many other observers, the presence or absence of light did not appear to exercise any perceptible influence upon their development.